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	Autore	Sivia D. S
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	Nota di contenuto	Cover; Contents; I: Some preliminaries; 1 Studying matter at the atomic

and molecular level; 1.1 Length scales and logarithmic axes; 1.2 Resolution, magnification and microscopy; 1.3 Structure, dynamics and spectroscopy; 1.4 Atomic building blocks and interactions; 1.5 Energy, length and temperature scales; 1.6 A table of useful constants; 2 Waves, complex numbers and Fourier transforms; 2.1 Sinusoidal waves; 2.2 Complex numbers; 2.3 Fourier series; 2.4 Fourier transforms; 2.5 Fourier optics and physical insight; 2.6 Fourier data analysis; 2.7 A list of useful formulae; II: Elastic scattering
 3 The basics of X-ray and neutron scattering 3.1 An idealized scattering experiment; 3.2 Scattering by a single fixed atom; 3.3 Scattering from an assembly of atoms; 3.4 X-rays and synchrotron sources; 3.5 Reactors and pulsed neutron sources; 4 Surfaces, interfaces and reflectivity; 4.1 Reflectivity and Fourier transforms; 4.2 Reflectivity and geometrical optics; 4.3 X-rays, neutrons and other techniques; 5 Small-angle scattering and the big picture; 5.1 Diffraction and length scales; 5.2 Size, shape and molecular form factors; 5.3 Assemblies and correlations; 5.4 Pair-distribution function
 5.5 Contrast matching 6 Liquids and amorphous materials; 6.1 The middle phase of matter; 6.2 Radial distribution functions; 6.3 Structure factors; 6.4 Comparison with small-angle scattering; 6.5 The Placzek correction; 7 Periodicity, symmetry and crystallography; 7.1 Repetitive structures and Bragg peaks; 7.2 Patterns and symmetries; 7.3 Circumventing the phase problem; 7.4 Powdered samples; 7.5 Magnetic structures; III: Inelastic scattering; 8 Energy exchange and dynamical information; 8.1 Experimental considerations; 8.2 Scattering from time-varying structures
 8.3 A quantum transitions approach 9 Examples of inelastic scattering; 9.1 Compton scattering; 9.2 Lattice vibrations; 9.3 Molecular spectroscopy; A: Discrete Fourier transforms; B: Resonant scattering and absorption; References; Index; A; B; C; D; E; F; G; H; I; J; K; L; M; N; O; P; Q; R; S; T; U; V; W; X; Y

Sommario/riassunto

The opportunities for doing scattering experiments at synchrotron and neutron facilities have grown rapidly in recent years and are set to continue to do so into the foreseeable future. This text provides a basic understanding of how these techniques enable the structure and dynamics of materials to be studied at the atomic and molecular level. Although mathematics cannot be avoided in a theoretical discussion, the aim has been to write a book that most scientists will still find approachable. To this end, the first two chapters are devoted to providing a tutorial background in the mathematics